

KNITTABILITY OF FIBRES WITH HIGH STIFFNESS

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Knitting techniques and machinery are extensively used for the production of textile products for garment and industrial use. Knitting is also gaining importance for composite materials performing. Basically two principles are in use [1-3]. i) Weft knitting gives structures of for example traditional sweaters types suitable for structures taking impact loads. ii) Warp knitting gives the traditional tricot structures and the non crimped insert yarn DOS-fabrics extensively used for composite materials fabrication.

In the knitting process do hooked needles pick up yarns and form closed loops. The stability of the loop formation depends on the bending of the fibres and type of friction on the needles during the different stages of the knitting process. The characteristics of static friction when the yarn is drawn by the needles into the machine, sliding friction in the loop formation and release after loop formation are of vital importance for the final product. The complexity of the yarn behaviour, the far from ideal mechanical and tribological behaviour of the fibres are mastered by many knitters. The history of knitting indicate the same kind of phenomena as indicated by the history of the steam engine: "Science owes more to the steam engine than the steam engine owes to science", lord Kelvin.

The knitting process has however been modelled from first principles using models for friction of fibres on positively curved surfaces and simultaneous plastic deformation.

A method and fixtures based on earlier work by Andersson et.al adopted for tests of the stress build up in fibres on knitting needles in order to study the knitting process in a tensile testing machine have been developed [3-5]. Monofilaments and high modulus multifilament yarns known for giving difficulties in knitting process have been studied with respect to :

- Static friction
- Bending radius of the fibre during the process
- Adhesion to needle at the end contact
- Sliding friction

Plain knitted fabrics and symmetric spacer fabrics have been produced of monofilament and multifilament nylon, PET and aramides. Analysis of fabrics in compression is going on.

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